$2.00 VOLUME 2 · 1987

R/D COMPUTING

VER 25

Dedicated to TI 99/4A and 9900 Computer Systems

Ryte Data

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Ahhh, we seem to be a little more caught up with this issue... at the expense of "size" for each issue. As I recall, we went through this last year at this time. A marginal improvement.

You will notice that there is a lack of advertising contained. Even that area is suffering in the TI market. Many support companies report that they lack funds to advertise on a regular basis. Sound familiar?

As noted last issue - the call for new subscribers is still needed. We have noticed several users groups stating that more input is needed or that free photocopying is no longer available... thus affecting their group publication.

With an "installed" base of 2.5 million consoles, there should easily be a larger market force at work - even compared to the C-64. Again, the owners that we need to reach are truly orphaned.

There is no lack of good material - the shortfall is in achieving the "numbers". Encourage a friend!

GERMAN GRAM CRACKER

Mike Heuser of the TI 99er Workshop Rheinland reports that their club has developed a cartridge port GRAM device called the "GRAM LOADER CARTRIDGE". It works in the same manner as the MAXIMEM or MG GRAMKRACKER. The initial notice indicates that the device can download modules; carries a module port; can load & run GPL code and can expand memory up to 104k.

This sounds very interesting as it can also use cassette for storing and loading programs. The device was apparently designed by members of the TI club. We will obtain further details ASAP. Price is estimated to be lower that the discontinued MG GRAMKRACKER.

MYARC 9640

According to several sources, the full operating system for the 9640 is still not completed. Peter Hodie and Paul Charlton are working very hard to get the entire program up and running WITHOUT bugs.

Critics note that releasing the computer without a FULL operating system was a mistake. Hey folks, ATARI, Apple and Commodore all did the same thing - perhaps with a relatively more complete initial version but none the less several updates have been issued by all three LARGER manufacturers. I understand that Apple, for example, has a full time programming staff of 47 people. A company might spend $1,410,000 per year on that type of effort. Fairly simple logic to extrapolate regarding the TI community and support economics!

32K ON THE 16 BIT BUS

by John Clulow

Based on ideas from Mike Ballman

The following is a step-by-step description of how to add 64k of RAM memory on the 16 bit bus. The present modification uses only 32k. This corresponds to the memory space of the 32k Memory Expansion. The modification yields a speed increase of about 50%.

Mike Ballman is currently working on a circuit to allow CRU decoding of the remaining 32k. This will open a whole new area of powerful software, including such possibilities as a real DOS which could be loaded into RAM from disk on power-up. The 32k modification described below can easily modified for full decoding upon completion of Mike's work.

You will need two Hitachi HM62256LP-12 RAMs. One source of these is Microprocessors Unlimited. They cost around $12.00 each. You'll also need a 74LS21 and a 74LS153. These can be obtained from various electronics supply houses. All wiring should be done with wire wrap wire. You should use a low wattage soldering iron with a fine, pencil type tip. A grounded soldering iron is a good idea.

The modification is done on the main board of the Black and Silver console. You'll need to refer to the Logic Board Component Location Diagram in the TI 99/4A Console Technical Manual. (Available from Texas Instruments, Box 53, Lubbock, TX 79408 - Dealer Parts for $25.00)

INSTRUCTIONS:

(1) Remove the board from the console and identify the two ROM's. They are located between the GROM connector and the 9900 CPU. One is parallel to the 9900 and the other is perpendicular to it. They are U610 and U611 on the Component Location Diagram.

(2) Bend the pins on the HM62256 IC's closer so they will firmly contact the ROM pins when piggy backed. One way of doing this is to place the RAM on it's side on a table and then move the body of the IC toward the table to bend the pins uniformly.

(3) Bend out the following pins on both HM62256 RAMS: 1 2 20 22 23 26 27 28. These pins will NOT be soldered to anything on the ROM's. Holding the IC with the notch up and looking at the top, pin numbers start with pin 1 on the upper left, go down the left side, then across and up the right side. Pin 28 is opposite pin 1 on the end with the notch.

(4) Place one HM62256 over the ROM that is parallel to the 9900 CPU. Make sure the notch points toward the 9900 and the writing on the 9900 and the 62256 can be read from the same direction. Place the RAM such that pins 1 2 27 and 28 extend beyond the end of the ROM. The unnotched end (pins 13 14) of the RAM should line up with the un-notched end of the ROM. There should be a sort of "spring tension" that clamps the RAM pins onto corresponding ROM pins below it. This will help to ensure good solder [illegible] If the RAM doesn't fit tightly, remove it and bend the pins closer.

(5) Solder all RAM pins not bent out to the ROM pins below. Use a low wattage iron with a fine, pencil type tip. Inspect each joint carefully in good light, under magnification.

(6) Place the second 62256 on the ROM that is perpendicular to the 9900. The notch of the RAM points away from the 9900 - toward the edge of the board. As above, solder and inspect all pins that were not bent out.

(7) Bend out the 74LS21 pins 1 2 4 5 6 8 10 12 14. Note that pins 1 and 14 are across from each other on this 14 pin IC. This leaves only pins 3 7 9 11 13.

(8) The 74LS21 will be piggy-backed on the 74LS138 U504. This IC is located adjacent to the end of the board where the I/O edge connector is. There are two 138's next to each other. U504 is the one nearest the end of the board. You will place the 74LS21 so that the UN-NOTCHED end lines up with the un-notched end of the 138 (pointing

toward the cassette connector). Pins 1 and 16 of the 138 will extend beyond the notched end of the 74LS21 chip.

(9) Before positioning the 74LS21, solder 1/2" lengths of wire-wrap wire to the 138 pins 7 and 9. Then position the 74LS21 on top of the 138 and solder all pins not bent out to the 138 pins below. Inspect the connections.

(10) Bend out all of the 74LS153 pins EXCEPT 8 and 16.

(11) Place the 153 over U613, a 74LS194. The notch will line up with the 194 notch and point toward the edge of the board away from the 9900. Solder pins 8 and 16 of the 153 to pins 8 and 16 of the 194 below.

(12) At the end of the 9900 opposite to where the RAM's have been piggy backed, you will see a line of three IC's. They are 74LS00, 74LS32 and 74LS04. The 74LS00 is U606 and the 74LS32 is U605. Turn the board upside down so you can see the traces. Find the trace that runs from pin 11 of the 74LS00 (U606) to pin 13 of the 74LS32 (U605). Double check to make sure you've done the pin numbering correctly. When you've found the trace, cut it with a knife so there is no continuity between the 74LS00 pin 11 and the 74LS32 pin 13.

(13) Identify the piggy backed RAM that is perpendicular to the 9900. Solder wire wrap wires connecting every bent out pin on the RAM to the corresponding bent out pin on the RAM that is parallel to the 9900. Pin 1 to pin 1, pin 2 to pin 2 etc. There will be eight wires in all to solder.

(14) Solder wire-wrap wires to make the following connections on the RAM that is parallel to the 9900:

Pin 1 goes to pin 24 of the 9900 (solder the wire to the 9900 pin on top of the board).

Pin 2 goes to the 9900 pin 22.

Pin 20 goes to two places. Connect pin 20 of the RAM to pin 22 of the RAM and also to pin 8 (bent out) of the 74LS21. There should be two wires coming off pin 20 of the RAM.

Pin 23 of the RAM goes to pin 21 of the 9900.

Pin 26 of the RAM goes to 23 of the 9900.

Pin 27 of the RAM goes to pin 61 of the 9900 (fourth from the top on the right side).

Finally connect pin 28 of the RAM to pin 20 of the 74LS244 adjacent to the piggy backed 74LS21.

(15) Connect the following 74LS21 pins with a bare wire: 1 2 4 and 14. Connect the short wire from the 138 pin 7 to the 74LS21 pin 5 (bent out). Connect 74LS21 pin 6 to 74LS21 pin 12. Connect 74LS21 pin 8 (bent out) to the piggy backed 153 pin 2. Connect the short wire coming from the 138 pin 9 to 74LS21 pin 10. Finally, connect the 74LS21 pin 14 to the 74LS244 pin 20 that you connected the RAM pin 28 to.

(16) OK, we're almost done, so take a break and have a beer.

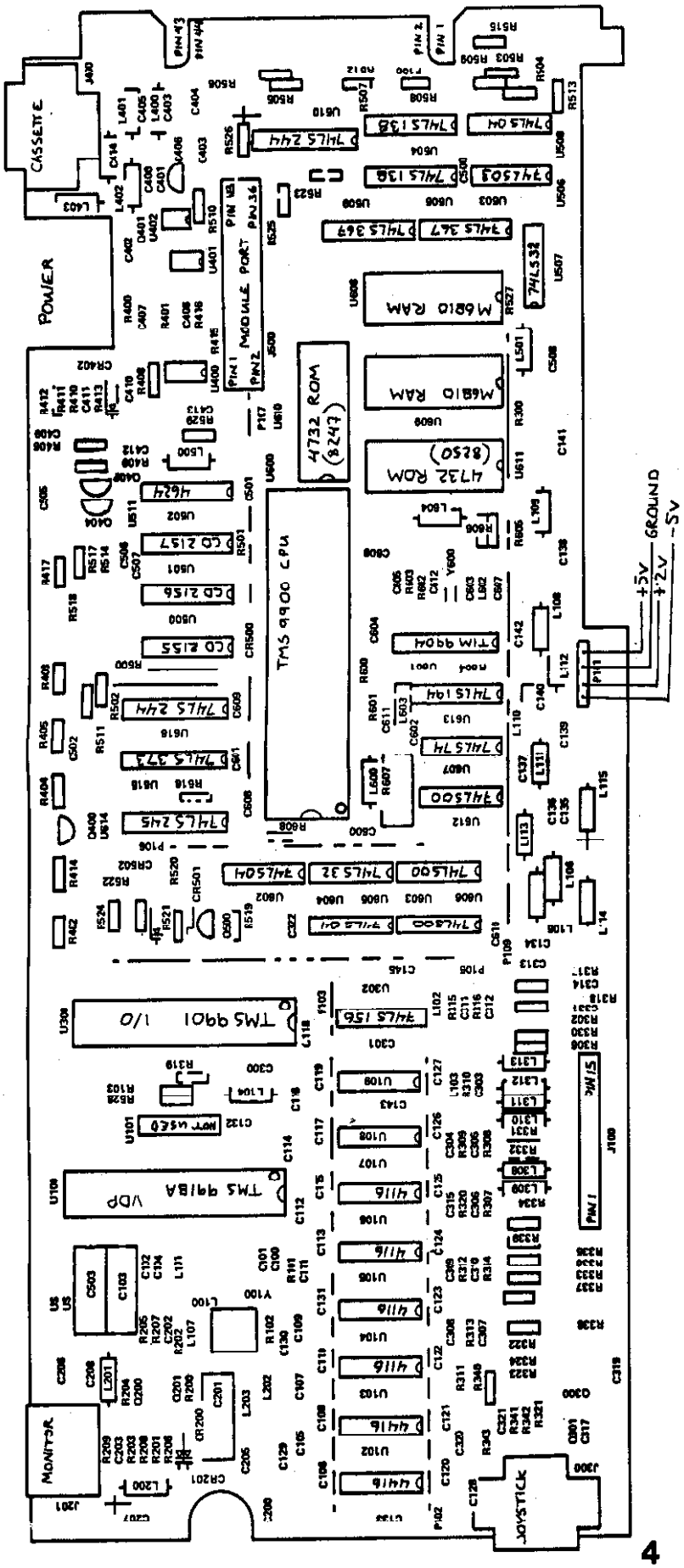
(17) On the 153, connect pin 9 to pin 13 on the 74LS32 (U605). Pin 10 of the 153 goes to pin 14 of the 74LS74 next to it (U607). Also connect pin 10 of the 153 to pins 11 and 13 of the 153. Connect pin 12 of the 153 to pin 15 of the 153 and then connect pin pin 15 of the 153 to pin 7 of the 74LS00 U612 (next to the 74LS74). Connect pin 14 of the 153 to pin 11 of the 74LS00 U606: that's the one you cut the trace on.

(18) That's it! Now have another beer before putting your computer back together. When you try it out, remember that this version is not compatible with any other 32k in the system.

If you have problems with this I can't promise I can help but feel free to give me a call or write EMAIL (419) 874-8838. Ask for John (or Hose Head.)

EDITORS NOTE: Long time subscribers will recall a 32k product which involved removing the 9900 CPU. This approach has the same speed increase and the potential to add some very powerful features.

Remember: when first turning your machine on after doing this modificaton - keep your finger on the power switch. If the title screen does not come up normally - SHUT YOUR SYSTEM DOWN AND CHECK IT!

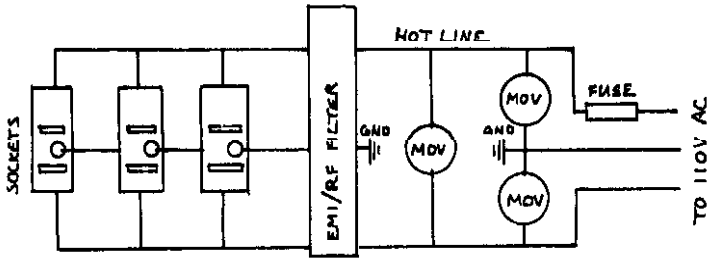

CASSETTE
POWER
MODULE PORT
TMS 9900 CPU
4732 ROM (8247)
4732 ROM (8250)
M6810 RAM
M6810 RAM
TMS 9901 I/O
TMS 9918A VDP
MONITOR
JOYSTICK
SIMC
+5V
+12V
-5V
GROUND

CARBON CONVERTER

by William Borchardt
Sun City 99ers

First off, those that subscribe to Computer Shopper may be contemplating putting together the Surge Protector featured in the July TI Forum. It is without a doubt a great idea. I would offer this advice though for anyone that is going to build it - make sure the Surge protector is well fused, as I have seen the MOV's (Metal Oxide Varistor) literally explode during extremely high surges. When they explode they can come into contact with grounded frame parts (yes, I've seen it happen), so by all means build yourself one - just make sure the input power lead is fused. Don't rely on the house circuit breaker. While on this subject, I'd like to clear up a mis-conception ab Surge protectors that some folks have. A Surge protector is not a fail safe device. If a high voltage pulse with a very fast rise time hits your lines, the initial inrush of current may get past the MOV or Spark Gap device right into your system. ZAP. Instant Silicon to Carbon conversion. Even if you have some sort of Surge protection, don't play in the lightening. OK?

CONNECT MOV ACROSS THE + AND - LINES: FROM THE + LINE TO GROUND: FROM THE - LINE TO GROUND. CONNECT THE RF/EMI FILTER ACROSS THE + AND - LINES. THE PROJECT CAN BE INSTALLED IN A POWER BAR CASE.

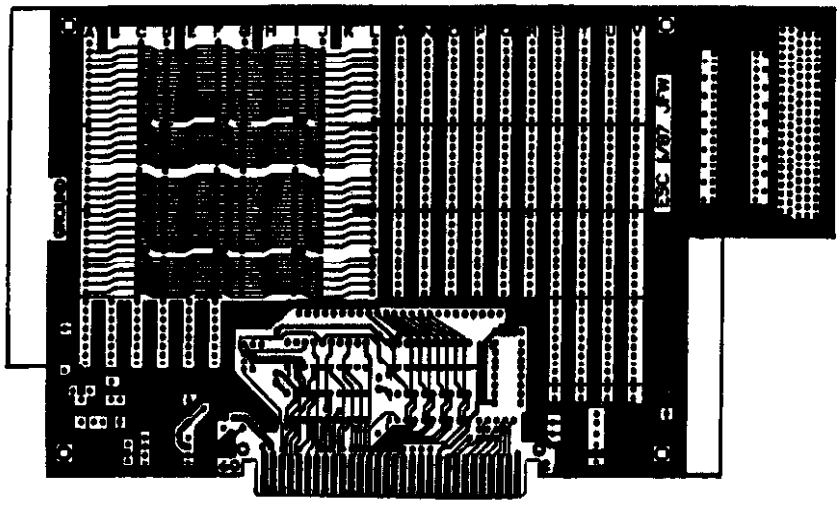


PARTS:
15A 110V FUSE
3 METAL OXIDE VARISTOR
1 RFI/EMI FILTER
POWER BAR W/ THREE(+) SOCKETS

Well, how's the co-processor going you ask? The wire wrap is done, I still have to check for errors (yes, it does happen to everyone!). If all goes well, the rest of this month and next month I'll be putting together the operating system. If it is workable by the next newsletter there will be more info on it. The way things are going I may have the co-processor done before I get the Geneve. If that sounds a little cynical, it wasn't meant to be. Here is what I intend to do, if you don't know already.

The whole idea to the co-processor is to have a device that will allow for an increase in speed that will easily allow changes to the operating system. Presently you have the capability to change the operating system via any of the GROM simulators with the help of a GPL assembler. But you are still stuck with the speed of a GROM. I envision the co-processor to act like a GROM, but at a much high clock rate. I would end up very pleased if I couldn't read each line of a program before the next line scrolled on the screen (BASIC listing). At the same time I envision the final product to allow for system enhancements, such as using it's slack time for printer buffering etc. To allow for some sort of multi-tasking, I would like for the final product to connect to either the I/O bus or the cartridge slot. The initial product, for simplicities sake, will connect internally. With the co-processor in place all of the internal GROM's would have to be removed (they are socketed) and the system ROM's would have to be replaced (they are not socketed).

The replacement ROM's should have a loader that would allow custom operating systems to be booted in, or if the desire is merely speed, only the GROM's would need to be removed... thus simplifying matters. As mentioned, it will connect directly to the bus, no co-processor interface. Since it is a GROM simulator (mostly) there is no real need for the added complexity of a co-processor interface, though it would serve an end of sorts. So there you have it: it is an active project even though its not yet completed.



NEW PROTO-TYPING BOARD FOR PEB
by John F. Willforth

It's finally here after a summer of design changes, and enhancements. The new board will enable the experienced designer as well as the beginner or novice to bring their IDEA to reality. It will also be the ideal carrier for many of the great ideas coming out in periodicals and newsletters supporting the TI community.

Scott Coleman and myself, have tried to incorporate the most flexability and desireable features of a **Proto-typing board**, as well as a **general purpose project carrier** for the PEB. The Proto-typing board can be used in the 99/4A environment, as well as the 99/8, and the NEW GENEVE (9640). There should be no possible application in the ORIGINAL TI PEB, that this board cannot satisfy.

* For the 99/4A, all the standard address, data, and control are brought up through the recommended 74LS244, 74LS245, and either a 74LS125, or chip of your choice, to easily be interfaced to your circuit. The board will support both solder tail or wire-wrap.
* For the 99/8, the 3 additional address lines are brought up on board.
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* The board has columns identified by alpha characters, and rows identified by 10's, thus making the construction much easier.
* The board supports directly two voltage sources.
* Due to the large potential for the use of the 6264 and 62256 Low Power static RAMs, the [redacted] areas to enable the easy development with this chip.
* To go with the further support the RAM, there are three 16 pin chip locations below the RAM area for decoding and setting CRU addresses.

For more information call or write: (412) 527-6656,
John Willforth, R.D. #1 Box 73A, Jeannette, PA 15644.
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Articles dealing with Texas Instruments 99/4A and 9900 based computers are published. Special attention is given to projects and information on upgrading and modifying the 99/4A console and system.

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- **V24** Triple Tech project, 80 Column Display II, RGB Conversion Project Part II, 64k
- **V25** German GRAM CRACKER, Co-processor update, Proto [redacted]

13/2/88 #117

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